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ABSTRACT

Previous research in classification preference has focused on only a few selected age groups. To investigate the classification preferences of individuals from early childhood through old age in the same study, 144 individuals between the ages of 4 and 70 completed a revised version of the Conceptual Styles Test. Analysis of results showed that the number of similarity classifications increased from the 4- to the 40-year-old group and decreased thereafter; the number of complementary responses decreased and then increased. The 20-year-old group used more perceptual similarity classifications while the 30- and 40-year-old groups used more functional similarity classifications. One purpose of the study was to determine whether, as Kogan has suggested, elderly adults are more creative and free-wheeling in their classification responses than younger individuals. Two measures of creativity were employed; one was based on the experimenter's judgments and one based on the frequency with which the same response was given by other subjects. Neither measure indicated that the elderly individuals were more creative than the other age groups. (Author/JAC)

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A Lifespan Study of
Classification Preference

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Running Head: Lifespan Classification

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Abstract

Individuals between the ages of 4 and 70 were presented with a revised version of the Conceptual Styles Test. The number of similarity classifications was found to increase from the 4- to the 40-year-old group and to decrease thereafter; the number of complementary responses was found to decrease and then increase. The 20-year-old group used more perceptual similarity classifications while the 30- and 40-year-old groups used more functional similarity classifications. One purpose of the study was to determine whether, as Kogan has suggested, elderly adults are more creative and free-wheeling in their classification responses than younger individuals. Two measures of creativity were employed; one was based on the experimenter's judgements and one based on the frequency with which the same response was given by other subjects. Neither measure indicated that the elderly individuals were more creative than the other age groups.

Index terms: Conceptual Style

Human Development

Cognitive Development

A Life Span Study of Classification Preference

In a 1974 review of the literature Denney (1974a) concluded that between the ages of about six and nine there is a change from a tendency to categorize according to complementary criteria (putting things together because they share a complementary relationship) to a tendency to categorize according to similarity criteria (putting things together because they are similar in some way). Her conclusion was based upon studies of free classification (Annett, 1959; Inhelder & Piaget, 1964), word association (Brown & Berko, 1960; Ervin, 1961), conceptual style (Kagan et al., 1963), word definitions (Binet & Simon, 1915; Feifel & Lorge, 1950; Werner & Kaplan, 1952; Wolman & Barker, 1965), and memory (Denney & Ziobroski, 1972).

Denney (1974a) has also reviewed studies of classification during the later adult years. Studies by Annett (1959), Denney (1974b), Denney and Lennon (1972), Rigel (1968), Riegel and Riegel (1964), indicate a tendency for elderly adults to revert to using more complementary criteria in classification than younger adults. Since the Denney review, additional studies have supported her contentions that elderly individuals tend to classify more like young children than like young or middle-aged adults. Circirelli (1976) and Smiley and Brown (1979) found that both young children and elderly adults tend to use more complementary and fewer similarity classifications than college students. Further, Kogan (1974) found that, whereas college students tend to use more categorical and analytic responses (i.e., similarity responses) on the Gardner object-sorting task, elderly adults tend to use more relational-thematic responses (i.e., complementary responses) than the college students.

Training research indicates that the age differences that have been found in classification are more a result of age differences in preference rather than an age difference in ability. Several investigators have found that children as young as two years of age can be taught to classify according to similarity criteria (Baird & Bee, 1969; Denney, 1972; Denney & Acito, 1974; Kagan et al., 1964; Smiley & Brown, 1979). Further, Denney (1974b) demonstrated that elderly adults who do not spontaneously classify according to similarity criteria can be taught to do so.

One explanation for the age differences in classification preference was suggested by Kogan (1974). He suggested that, at least on the Gardner object-sorting task, the categorical and analytic responses (i.e., similarity responses) were the most "obvious and compelling" responses and that the relational responses (i.e., complementary responses) were more subtle and required a more "free-wheeling and adventurous orientation to the sorting task." Thus he has suggested that, at least for elderly adults, the complementary responses may be more individualistic and creative. In a more recent paper, however, Kogan (1982) has stated that "...it is dubious whether this author's earlier claim linking complementarity to a more 'free-wheeling' cognitive approach can any longer be justified in the absence of directly relevant empirical evidence" (p. 593).

One purpose of the present study was to investigate the classification preferences of individuals from early childhood through old age in the same study. Since previous research has focused on only a few selected age groups rather than on a number of groups representative of both childhood and the entire adult life span, only very general conclusions can be drawn.

For example, previous research indicates that both young children and elderly adults tend to use more complementary criteria than other age groups, while individuals between these two age extremes tend to use more similarity criteria. The first purpose of the present study was to examine these general developmental changes in more detail, and to make more specific comparisons between age groups that use the same general type of classification. For example, are the complementary classifications used by young children similar to those used by elderly adults or do they differ in significant ways? And, are the similarity classifications used by different age groups similar or different? In order to answer such questions, individuals from a variety of different age groups across the entire life span need to be presented with exactly the same stimuli and instructions.

The second purpose of the present study was to test the hypothesis suggested by Kogan (1974) that the complementary classifications of elderly adults are more "free-wheeling" and creative than those of younger individuals. Thus, in addition to recording the actual classifications, the explanations given for the classifications were recorded so that both the classification responses and the classification explanations could be scored for creativity.

Method

Participants

The names of potential subjects were randomly chosen from the State Census for Lawrence, Kansas. A letter explaining the experiment and requesting their participation was sent to all the potential adult subjects. A few days later each was called on the phone in order to set up

an appointment. The parents of the potential child subjects were called and asked for permission for their children to participate. About 50 percent of all the potential subjects agreed to participate.

This procedure was continued until eight males and eight females were obtained in each of the following age groups: 4, 6, 8, 12, 20-25, 35-40, 45-50, 55-60, 65-70. The average age of the females in each of the adult age ranges was 20.50, 35.75, 46.25, 58.25, and 66.75; that of the males was 21.00, 37.25, 47.00, 56.75, and 68.00. The average level of education of the females in each of the adult age groups was 14.50, 14.00, 15.00, 14.50, and 11.75; that of the males was 14.25, 17.00, 17.50, 14.50, and 12.88. The subjects were predominantly from white, middle-class households.

Procedure

The subjects were all tested in their own homes by an experimenter in her early twenties. The experimenter presented each subject with a modified version of the Conceptual Styles¹ Test (Kagan et al., 1963). The test was developed by Kagan for children and young adults; however, because the test is simple and consists only of objects familiar to all ages, there is no reason to believe that the test is not valid across the entire life span. The test booklet contained 29 pages. On each of the pages were pictures of three separate objects that could be categorized in a variety of ways (e.g., matches, pipe, saxophone). The object on the left of the page had an "A" beneath it, the object in the center of the page had a "B" beneath it, and the object on the right of the page had a "C" beneath it. The subject was then given the following instructions:

On each page of this booklet you will see three objects. I want you to choose the two that are

alike or go together and circle the letters under those two objects. Then I want you to tell me how the two objects are alike or how they go together.

The reasons that the subjects gave for putting two objects together were recorded verbatim. On the basis of these reasons, each subject's response to each of the 29 items was scored as being either a complementary or a similarity classification. Responses were scored as complementary classifications if the two objects were said to share a complementary relationship (e.g., the pipe and the matches go together because you light the pipe with the matches); they were scored as similarity classifications if the two objects were said to be similar in some way (e.g., the pipe and the saxophone go together because they are both the same shape).

Results

Each classification response was first scored as being either a complementary or a similarity response. Since the total number of complementary responses plus the total number of similarity responses always added up to 29, it was only necessary to analyze one of these types of responses since the analysis of one would be identical to that of the other. Thus, the first dependent variable was the total number of complementary responses given by each subject. A preliminary analysis of variance in which age and sex were factors was performed on the dependent variable. This analysis indicated that neither sex, $F(1,54) = .12$, $p = .73$, nor the interaction between age and sex, $F(8,54) = 1.52$, $p = .17$, was significant; only age was significant, $F(8,54) = 4.74$, $p = .001$, $\omega^2 = .28$. Therefore, the sex factor was collapsed for the following analysis.

The means and standard deviations of the number of complementary classifications for each age group are presented in Table 1. A trend analysis, in which only trends across age were tested, was performed on these scores. This analysis revealed a significant quadratic trend, $F(1,63) = 13.33$, $p < .005$; $\omega^2 = .13$. In general, the total number of complementary responses decreased from the 4- to the 40-year-old group and then increased thereafter, although there was a slight increase from the 4- to 6-year-old group. A Least Significant Difference (LSD) multiple comparison test revealed that the 4-, 6-, 8-, 12-, and 60-year-old groups used significantly more complementary responses than the 20-, 30-, and 40-year-old groups.

 Insert Table 1 here

Each classification response was also scored as being one of six more specific types based on the explanations given for the classification. These six types were: (1) perceptual similarity, in which two objects were put together because they look alike (e.g., both objects are tall and thin); (2) functional similarity, in which two objects were put together because they both serve similar functions (e.g., both hold liquid); (3) unusual similarity, in which two objects were put together because they are similar in an unusual way (e.g., a parachute and an umbrella both provide shelter from the rain); (4) complementary, in which two objects were put together because they share a complementary relationship (e.g., the horse pulls the stagecoach); (5) unusual complementary, in which two objects were put together because they share an unusual complementary relationship (e.g.,

the rabbit wears the glasses); and (6) story or fantasy, in which two objects were put together because they are both part of the same story or fantasy (e.g., the fireplace and the present go together because you sit by the fire and wrap the present). Two independent raters assigned the classification responses to these six categories; the inter-rater reliability was .93.

The total number of perceptual similarity responses, functional similarity responses, unusual similarity responses, complementary responses, unusual complementary responses, and story or fantasy responses was summed for each subject. These six totals were the dependent variables for the second analysis. Preliminary analyses of variance using age and sex as the independent variables were performed on these six dependent variables. These analyses revealed no significant effects for sex or for the interaction between age and sex. As a result, the sex factor was collapsed for the following analyses. Age was a significant factor in four of the analyses: that of perceptual similarity responses, $F(8,54) = 2.48$, $p < .02$, $\omega^2 = .14$; that of functional similarity responses, $F(8,54) = 4.26$, $p < .001$, $\omega^2 = .25$; that of complementary responses, $F(8,54) = 4.37$, $p < .001$, $\omega^2 = .27$; and that of unusual complementary responses, $F(8,54) = 3.02$, $p < .007$, $\omega^2 = .19$. Table 2 presents the means and standard deviations of the six dependent variables for each age group.

 Insert Table 2 here

A trend analysis across age was subsequently conducted on each of the four dependent variables for which age was a significant factor. The

analysis of the number of perceptual similarity responses revealed a significant quadratic trend, $F(1,63) = 6.01$, $p < .02$, $\omega^2 = .06$. In general, the number of perceptual similarity responses increased from the 4- to 20-year-old group and then decreased thereafter. An LSD multiple comparison test revealed that there was a significant difference between the 20-year-old group and all the other age groups.

The analysis of the number of functional similarity responses also revealed a significant quadratic trend, $F(1,63) = 10.79$, $p < .003$, $\omega^2 = .11$. In general, the number of functional similarity responses increased from the 4- to 40-year-old group and then decreased thereafter. An LSD multiple comparison test revealed that there was a significant difference between the 4-, 6-, 8-, 12-, 60-year-old groups and the 30-, 40-year-old groups.

The analysis of the number of complementary responses revealed a significant quadratic trend, $F(1,63) = 12.10$, $p < .001$, $\omega^2 = .11$. The number of complementary responses decreased from the 4- to the 40-year-old group and then increased thereafter. An LSD multiple comparison test revealed that there was a significant difference between the 4-, 6-, 8-, 12-, 60-year-old groups and the 20-, 30-, 40-year-old groups.

The analysis of the number of unusual complementary responses revealed a significant linear trend, $F(1,63) = 10.69$, $p < .002$, $\omega^2 = .11$. In general, the number of unusual complementary responses decreased from the 4- to the 8-year-old group and then remained fairly constant thereafter. An LSD multiple comparison test revealed that there was a significant difference between the 4-year-old group and all the other age groups.

The final dependent variable was the number of "unique" answers given by each subject. A response was scored as being unique if the explanation given for the classification was given by five percent or fewer of all the subjects. An analysis of variance in which age and sex were the independent variables was performed on the number of unique answers. This analysis revealed no significant effects for age, sex, or the interaction between age and sex.

Discussion

The first purpose of the present study was to investigate the classification preferences of individuals from early childhood through old age. The results of the first analysis indicated that the number of complementary responses decreased from the 4- to the 40-year-old group and increased thereafter. The number of similarity responses, on the other hand, increased from the 4- to 40-year-old group and decreased thereafter. This finding is consistent with the findings of earlier studies of classification (Annett, 1959; Circirelli, 1976; Denney, 1974b; Kogan, 1974; Smiley & Brown, 1979).

When the classification responses were further subdivided into six more specific types, the results indicated that both the number of perceptual similarity responses and the number of functional similarity responses followed a quadratic trend. The 20-year-old group used more perceptual similarity responses than either the younger or older age groups, and the 30- and 40-year-old groups used more functional similarity responses than either the younger or older age groups. The number of complementary responses also followed a quadratic trend, with the 40-year-old group giving fewer complementary responses than either the younger or older age

groups. Finally, there was a linear decrease in the number of unusual complementary responses with increasing age.

The second purpose of the present study was to test the hypothesis suggested by Kogan (1974) that the complementary classifications of elderly adults are more free-wheeling and creative than those of younger individuals. In order to test this hypothesis, two methods were used to evaluate the unusualness and uniqueness of the classification responses. First, when the responses were subdivided into the six specific types mentioned above, three of the types were considered to be unusual or idiosyncratic; these were the unusual similarity, unusual complementary, and story or fantasy types. Analyses performed on these three types of responses revealed that there was no significant difference among the age groups on either the number of unusual similarity responses or the number of story or fantasy responses. There was, however, a significant age effect for the number of unusual complementary responses; the 4-year-old group gave more unique responses than any of the older age groups. Thus, when the authors' judgements regarding which responses are unusual or idiosyncratic are used as a measure of the creative or free-wheeling nature of the responses, there were either no age differences or the very youngest group appeared to be more creative. Thus, there was absolutely no evidence that the older age groups gave more unique, unusual, or idiosyncratic responses.

Because using the authors' judgements regarding response uniqueness was not the only, nor necessarily the best, measure of creativity, a second, more objective measure was also employed. According to this method, responses were scored as unique if they were given by five percent or fewer

of the subjects. Even when the responses were scored in this way, there were no age differences in the number of unique responses given. Thus, when creativity is measured by the frequency of unusual, idiosyncratic or unique responses, there is no reason to conclude that the elderly adults' classification responses are any more creative than those of the children who tend to use the same types of classifications.

As a final test of whether or not there are differences in the classification responses of children and elderly adults, the classifications of the 60-year-old group were more closely compared to the classifications of the 4-, 6-, 8-, and 12-year old groups. The results of this analysis revealed that there were no significant differences between the 60-year-old group and the four youngest age groups on the number of perceptual similarity responses, number of functional similarity responses, or number of complementary responses. The only significant difference between the eldest and the four youngest age groups was in the number of unusual complementary responses, with the 4-year-old group giving more unusual complementary responses than any other age group.

The classification responses obtained in the present study were divided into rather specific types so that slight differences between the responses of different age groups could be detected. However, in spite of this division, differences between the classifications of children and elderly adults were not obtained, with the one exception that the 4 year olds used more unusual complementary responses. Of course it is always possible that if the classification responses were subdivided in a different way, different results might be obtained. However, there is no evidence, on the basis of the present type of response classification system, that the

classifications of elderly adults differ in any significant way from those of younger individuals.

On the basis of the results of the present study Kogan's hypothesis that the classification responses of elderly adults are more creative and free wheeling than those of younger individuals does not seem to be supported. However, the results of the present study are consistent with a hypothesis proposed by Denney (1974a, 1974c). Denney proposes that the classification responses of young children and elderly adults tend to be similar because the life circumstances of young children and elderly adults are similar in many important and relevant ways. She suggests that both young children and elderly adults are capable of classifying according to either similarity or complementary criteria, but that they tend to use complementary criteria because complementary relationships are most salient in their environment. Objects are grouped naturally according to complementary criteria in space and time, e.g., cars are driven into garages, plates are put on tables, and coats are hung in closets. Since our environment is structured according to complementary relationships, complementary relationships should be readily apparent to everyone and, thus, predominant unless some other type of relationship is made equally salient. In school and in some occupations demands are made for more abstract types of classifications. As a result, older children and both young and middle-aged adults tend to use more abstract, similarity criteria than young children and elderly adults. However, once older adults no longer experience such pressure for the use of more abstract criteria, Denney suggests that they revert to the use of the more natural and salient complementary criteria.

While the results of the present study confirm the findings of earlier studies by indicating that both young children and elderly adults tend to use complementary responses more, and similarity responses less, than individuals between these two age extremes, they also indicate an interesting new finding. The results indicate that there are changes during the middle-adult years in the use of different classification criteria. From the 20s through the 40s there is a decrease in the use of both complementary criteria and perceptual similarity criteria. At the same time there is an increase in the use of functional similarity criteria. It may be that the perceptual similarity responses are more common in the 20-year-old group because 20 year olds have recently been involved in educational pursuits and there may be more of an emphasis on perceptual similarity relationships in school than there is in most occupations. As adults become more removed from educational demands and more involved in occupational demands they may experience more need to focus on functional similarity relationships. However, the tendency to use functional similarity classifications peaks in the 40-year-old group. In the 50-year-old group there is a decrease in functional similarity responses and an increase in complementary responses. If the increase in the use of functional similarity responses during the middle-adult years is a result of occupational demands, the decrease in the use of such responses in the 50- and 60-year-old groups may be a result of either a declining concern about, and emphasis on, occupational demands or retirement. There is some evidence that occupational demands are related to the extent to which adults use complementary and similarity classification criteria. Denney (1974c) found that middle-aged individuals who are employed in

professional occupations tend to use more similarity classifications than middle-aged individuals who are employed in nonprofessional occupations. It is not yet clear whether there is any relationship between occupation and the extent to which the different similarity criteria (e.g., perceptual or functional) are used. Further, it is not yet clear whether occupation actually has an effect on the use of different classification criteria or whether the relationship between classification criteria and occupation is a result of some other causal relationship. More research will be needed to test these hypotheses.

It is interesting to note that of all the age groups, only the 40-year-olds used more similarity than complementary criteria. This suggests that although being in school or in some occupations may require the use of similarity criteria, the complementary relationships that are more salient in the environment remain predominant.

And finally, it is also important to note that, while the age differences that have been found in this study have been discussed as if they were actual age changes, it is possible that some or all of the age differences are a result of cohort effects (see Baltes, 1968, and Schaie, 1965, for a discussion of cohort vs. age change effects). However, since the changes that have been found in the present study are similar to those obtained as long ago as the late 1950s (see Annett, 1959), it is unlikely that the cohort effects are very large; rather, it appears that the obtained age differences actually reflect age changes.

In summary, the results of the present study confirm that similarity classifications increase up to middle age and decrease thereafter while complementary responses decrease up to middle age and increase thereafter.

While young adults and middle-aged adults use more similarity classifications than children and elderly adults, the specific type of similarity classification changes from perceptual similarity in young adulthood to functional similarity in the thirties and forties. Further, the results also suggest that the types of classifications used by children and elderly adults appear to be similar. There is no evidence that their classification responses differ in any significant way.

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Table 1
Means and Standard Deviations of
Number of Complementary Responses

<u>Age group</u>	<u>$\bar{x}$</u>	<u>SD</u>
4	24.50	3.70
6	27.25	1.28
8	22.38	9.21
12	22.38	5.29
20-25	15.63	5.37
35-40	15.38	7.33
45-50	13.50	7.58
55-60	19.63 ¹	7.63
65-70	23.63	5.42

Table 2
Means and Standard Deviations of the
Six Specific Classification Responses

Type of Response	Age Group								
	4	6	8	12	20-25	35-40	45-50	55-60	65-70
Perceptual Similarity	.75(.71)	.13(.35)	.75(1.39)	.25(.71)	2.63(3.29)	1.00(.54)	1.38(2.39)	.13(.35)	0(0)
Functional Similarity	3.63(3.46)	1.50(1.19)	5.75(7.82)	6.25(5.09)	10.75(6.54)	12.63(7.07)	14.13(6.75)	9.25(7.56)	5.38(5.42)
Unusual Similarity	0(0)	.13(.35)	.13(.35)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Complementary	23.63(4.27)	27.00(1.60)	22.38(9.21)	22.25(5.39)	15.50(5.40)	15.38(7.33)	13.50(7.58)	19.50(7.73)	23.63(5.42)
Unusual Complementary	.75(.89)	.25(.46)	0(0)	.13(.35)	.13(.35)	0(0)	0(0)	.13(.35)	0(0)
Story or Fantasy	.25(.71)	0(0)	0(0)	.13(.35)	0(0)	0(0)	0(0)	0(0)	0(0)